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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.          | CONFIRMATION NO. |
|---|-------------|----------------------|------------------------------|------------------|
| 10/812,974  | 03/31/2004  | Masanori Kadotani    | 520.42565CX1                 | 5958             |
| 20457   | 7590        | 12/01/2006           | EXAMINER                     |                  |
| ANTONELLI, TERRY, STOUT & KRAUS, LLP<br>1300 NORTH SEVENTEENTH STREET<br>SUITE 1800<br>ARLINGTON, VA 22209-3873 |             |                      | ARANCIBIA, MAUREEN GRAMAGLIA |                  |
|   |             |                      | ART UNIT                     | PAPER NUMBER     |
|   |             |                      | 1763                         |                  |

DATE MAILED: 12/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/812,974

Applicant(s)

KADOTANI ET AL.

Examiner

Maureen G. Arancibia

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 39-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 39-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 07/06.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8 September 2006 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 39-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda (JP 9-17770-A) in view of U.S. Patent 6,921,724 to Kamp et al. The following rejection refers to the Machine-Assisted Translation (MAT; obtained from The Thomson Corporation; 2005) and Figures of Fukuda.**

In regards to Claims 39 and 45, Fukuda teaches a plasma processing method for conducting a plurality of different processing on a film on a front side of a specimen W placed on a mount surface of a specimen table 21 disposed inside a processing chamber (Figure 3) using plasma generated therein, comprising:

adjusting an internal temperature of the specimen table formed of a heat conduction member so that a temperature in a central portion of the specimen table becomes higher than a temperature in an outer circumferential portion of the specimen table by a predetermined value (Paragraphs 19, 29);

generating a plasma by supplying a processing gas to the interior of the processing chamber and processing the film by applying a bias electric power 19 to the specimen table (Paragraph 29);

while, after the specimen is placed on the specimen table, supplying a heat conducting gas with a lower pressure to a space between the mount surface positioned above the central portion of the interior of the specimen table and a rear side of the specimen, and supplying a heat conducting gas with a higher pressure to a space between the mount surface positioned above the outer circumferential portion of the interior of the specimen table and a rear side of the specimen to adjust the heat conducting gas to a predetermined pressure difference in spaces of the central and outer circumferential portions of the rear side of the specimen (Paragraphs 19, 39);

and processing the film while adjusting said pressure difference to a value different from the predetermined pressure difference. (Paragraphs 34-38)

While Fukuda discloses the dual coolant system and its use and the dual heat conducting gas system and its use as different embodiments, **Fukuda also expressly teaches that the embodiments are used together.** (Paragraph 16; *In this case, the supply system of a refrigerant and/or a warming medium **may be plural**. However, it is good **even when it is single**.*) Moreover, one of ordinary skill in the art would have been

Art Unit: 1763

further motivated to combine the teachings of Fukuda to combine the fine control over the surface temperature of the wafer provided by each embodiment (Paragraphs 32, 38) to obtain even better control over the surface temperature of the wafer, thereby obtaining a precise and repeatable etching process (Paragraph 41). In other words, one of ordinary skill in the art would expect that since each embodiment of Fukuda attempts such temperature control, using the two embodiments together would produce even better control. Lower temperature and higher heat conductance at the periphery could, for example, work together to accomplish the same goal of offsetting the excess radiant heating at the periphery. (Paragraphs 29 and 38)

Fukuda teaches that a ring-like protrusion that divides the two areas from each other is disposed on the upper surface of the table, the upper surface of the table contacting the rear surface of the specimen, as broadly recited in the claims. (Figure 3b; Paragraph 36)

Fukuda also teaches that the temperature of the specimen table is adjusted by adjusting the temperature of coolants passing through passages 14, 11 disposed at a central portion and an outer circumferential portion of the specimen table. (Paragraphs 26-29)

In regards to Claims 39-50, Fukuda does not expressly teach processing upper and lower films of a plurality of films on a specimen with different temperature profiles obtained with the process settings as recited in the claims, or that the temperature settings can be adjusted on the basis of information obtained before processing of the specimen.

Kamp et al. teaches processing upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and adjusting the temperature settings based on information obtained before processing of the specimen about the type of material of each film layer. (Figure 4C; Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Fukuda to process upper and lower films of a plurality of films on a specimen with different temperature profiles across the specimen, and to adjust the temperature settings based on information obtained before processing of the specimen about the type of material of each film layer. The motivation for doing so, as taught by Kamp et al., would have been to process multi-layered specimens with changing temperatures layer by layer so as to achieve profiles and selectivity that cannot be otherwise achieved (Column 11, Lines 28-30), without having to dedicate chambers for each temperature, increasing manufacturing flexibility and cost effectiveness (Column 11, Lines 30-39). Moreover, by changing the temperatures of the central and circumferential portions of the specimen, the wafer center to wafer edge depth and/or profile uniformity can be improved. (Column 9, Lines 30-49)

It further would have been obvious to one of ordinary skill in the art, in practicing the method taught by the combination of Fukuda and Kamp et al., through routine experimentation, to optimize the values of the pressures of the heat conductive gases and the temperatures of the cooling mediums in the manner recited in the claims (i.e. changing the pressures while holding the temperatures of the cooling mediums

Art Unit: 1763

constant, or if necessitated by the temperature profile desired on the specimen, changing the temperatures of the cooling mediums so as to attain a greater temperature gradient across the specimen), as result-effective variables to optimize the edge depth and/or etch profile uniformity *for the type of film layer being processed*. See Kamp et al., Column 8, Lines 28-58; Column 9, Line 10 - Column 11, Line 39.

### ***Double Patenting***

4. In view of the amendments to the claims as filed 8 September 2006, and in view of the restriction requirement made in the parent case U.S. Application Serial Number 10/372,831, the obviousness-type double patenting rejection over 10/372,831 has been withdrawn.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 39-50 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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